Claims

1. DNA sequence coding for a protein which is involved in the development of the nervous system, in particular the CNS, and is expressed in a tissue-specific and development-specific manner, wherein the DNA sequence comprises the following DNA sequences:

   (a) the DNA sequence of figure 1, figure 2, figure 3, figure 4, figure 5, figure 6, figure 7 or figure 8;
   (b) the DNA sequence of figure 9 or figure 10;
   (c) the DNA sequence of figure 11;
   (d) the DNA sequence of figure 12 or figure 13;
   (e) the DNA sequence of figure 14 or figure 15;
   (f) the DNA sequence of figure 16;
   (g) the DNA sequence of figure 17 or 18;
   (h) the DNA sequence of figure 19;
   (i) a DNA sequence hybridizing with (a), (b), (c), (d), (e), (f), (g) or (h);
   (j) fragments, variants, functional equivalents, derivatives or precursors of the DNA sequence of (a), (b), (c), (d), (e), (f), (g), (h) or (i); or
   (k) a DNA sequence which differs from the DNA sequence of (a), (b), (c), (d), (e), (f), (g), (h), (i) or (j) due to the degeneration of the genetic code.

2. The DNA sequence according to claim 1, which codes for a protein or peptide comprising the amino acid sequence of figure 1, figure 9, figure 11, figure 12, figure 13, figure 14, figure 15, figure 16, figure 17, figure 18 or figure 19, wherein the protein or peptide has the biological activity defined in claim 1.

3. An antisense RNA, characterized in that it is complementary to the DNA sequence of claim 1 or 2 and can reduce or inhibit the synthesis of the protein encoded by this DNA sequence.

4. Ribozyme, characterized in that it is complementary to the DNA sequence of claim 1 or 2 and can bind specifically to the RNA transcribed by this DNA sequence and can cleave it so as to reduce or inhibit the synthesis of the protein encoded by this DNA sequence.

5. Expression vector, containing the DNA sequence according to claim 1 or 2 or coding for the antisense RNA according to claim 3 or the ribozyme according to claim 4.

6. The expression vector according to claim 5, which comprises additionally the promoter of the human T gene or an ortholog of the T gene.

7. Expression vector according to claim 5 or 6, which codes for the T, T2 or T3 proteins or for fragments thereof in the form of a reporter fusion protein.

8. Host cell which is transformed with the expression vector according to any of claims 5 to 7.

9. Protein which is encoded by the DNA sequence according to claim 1 or 2 and which is involved in the development of the nervous system and is expressed in tissue-specific and development-specific manner, or fusion proteins, fragments, variants, derivatives or precursors of the protein.

10. Protein according to claim 9, which has one of the following motives:

Motive 1:

(A,T)(I,P,V)(L,T)(G,A,Q)(L,V)XXX(L,V)

Motive 2:

IYTDQWAN

Motive 3:

AXXXXXXXXXGXXXXXXAXXXXXXXXXXXXXXXXXQ

Motive 4:

SXXXXDX(12,20)KX(17,22)AXXXXXXXXL

Motive 5:

IYTDWANXXLX(K,R)

Motive 6:

KX(18,21)AXXXXXXXXLX(15,24)S

Motive 7:

NX(3,11)SXXXAXXXXXXXL

wherein X = every amino acid
(A,T) = amino acid A or T at this site
X(number 1, number 2) = number 1 to number 2 Xs at this site

11. Method of producing the protein according to claim 9, which comprises culturing the host cell according to claim 8 under suitable conditions and obtaining the protein from the cell or the culture medium.

12. Antibody which is directed against the protein according to claim 9 or fragment thereof.

13. Antibody according to claim 12, which is obtained by immunizing animals with a peptide having the sequence "EKGEDPETRRMRTVKNIAD".

14. Use of the DNA sequence according to claim 1 or 2, the antisense RNA according to claim 3, the ribozyme according to claim 4, the expression vector according to any of claims 5 to 7, the protein according to claim 9 or the antibody or the fragment thereof according to claim 12 or 13 for preventing or treating diseases of the nervous system, in particular of the CNS.

15. Use according to claim 14, wherein the disease of the nervous system is a tumoral disease of the CNS.

16. Use according to claim 14, wherein the treatment of diseases of the nervous system are the promotion of the neuronal regeneration in the case of injuries of the nervous system and degenerative diseases of the nervous system.

17. Use according to claim 14, wherein the treatment of diseases of the nervous system are the regeneration of the neuronal linkages and the regeneration of the innate and acquired malfunctions of the nervous system.

18. Use according to claim 15 for inhibiting the growth and spreading of tumor cells.

19. Diagnostic method for detecting a disturbed expression of the protein according to claim 9 or for detecting a changed form of this protein, in which a sample is contacted with the DNA sequence according to claim 1 or 2 or the antibody or the fragment thereof according to claim 12 or 13 and then it is determined directly or indirectly whether the concentration of the protein

and/or its amino acid sequence differs from a protein obtained from a healthy patient.

20. Diagnostic kit for carrying out the method according to claim 19, which contains the DNA sequence according to claim 1 or 2 and/or the antibody or the fragment thereof according to claim 12 or 13.

21. Non-human mammal whose naturally occurring T, T2 or T3 gene comprises a change in the gene structure or the gene sequence.

22. Non-human mammal, wherein a change of the gene structure of the T, T2 or G3 gene is achieved in the mammal by introducing a deletion in place of which a homologous or heterologous sequence is introduced.

23. Non-human mammal, wherein a change of the gene structure of the T, T2 or G3 gene is achieved by inserting a homologous or heterologous sequence in the corresponding gene naturally occurring in the mammal.

24. Non-human mammal according to claim 22 or 23, wherein the heterologous sequence is the selection marker sequence.

25. Non-human mammal according to claim 24, wherein the selection marker sequence conveys resistance to neomycin.

26. A method of producing a non-human mammal according to any of claims 21 to 25, characterized by the steps of:

(a) producing a DNA fragment, in particular a vector, containing a changed T, T2 or G3 gene, the T, T2

or T3 gene having been modified by inserting a heterologous sequence, in particular a selectable marker;

(b) preparing embryonal stem cells from a non-human mammal (preferably a mouse);

(c) transforming the embryonal stem cells from step (b) with the DNA fragment from step (a), the T gene in the embryonal stem cells being changed by homologous recombination with the DNA fragment from (a)

(d) culturing the cells from step (c),

(e) selecting the cultured cells from step (d) for the presence of the heterologous sequence, in particular the selectable marker,

(f) producing chimeric non-human mammals from the cells of step (e) by injecting these cells into mammalian blastocysts (preferably mouse blastocysts), transferring the blastocysts to pseudo-pregnant female mammals (preferably mouse) and analyzing the resulting offspring for a change of the T, T2 or T3 gene.

27. Transgenic cell or tissue which is capable of expressing a T protein or part of the T protein or an ortholog thereof.

28. Use of the non-human mammal according to any of claims 21 to 25 or the transgenic cell or the transgenic tissue according to claim 27 for the analysis of the function of the T gene family.

29. Use of the non-human mammal according to any of claims 21 to 25 or the transgenic cell or the transgenic

tissue according to claim 27 for identifying inhibitors and enhancers of the T gene family.

30. Vertebrate gene and functional equivalent, derivative or a bioprecursor thereof, which code for a protein having a statistically significant amino acid sequence homology to the T gene, T2 gene or T3 gene according to any of the following figures: figure 1, figure 9, figure 11, figure 12, figure 13, figure 14, figure 15, figure 16, figure 17, figure 18 or figure 19.

31. T gene and its vertebrate orthologs and vertebrate paralogs which code for a nuclear pore protein.

32. Vertebrate protein which has an amino acid sequence according to figure 1 or an amino acid sequence which differs from the amino acid sequence in figure 1 by one or more amino acids.

33. Vertebrate T, T2 or T3 gene and the protein encoded therein in all of its naturally occurring allelic and mutated forms.

34. Medicament containing a protein according to claim 9 or a functional equivalent, a fragment or a bioprecursor thereof in combination with a pharmaceutically acceptable carrier.

35. The method of identifying substances which has an enhancing or inhibiting influence on the effect of T protein, T2 protein or T3 protein, by means of

- determining the bi-directional transport through the nuclear pores,

- determining the binding to filaments of the cell (e.g. actin filaments and microtubuili) or
- determining the increased or reduced transcription of cellular or reporter genes.

36. Method of identifying substances which have an enhancing or inhibiting influence on the effect of proteins which are functionally linked to the T protein in direct or indirect way, or represent parallel signal or functional pathways, by means of
    - determining the bi-directional transport through the nuclear pores,
    - determining the phosphorylation and the dephosphorylation of proteins,
    - determining the binding of the T protein to filaments of the cell (e.g. actin filaments and microtubuli), or
    - determining the increased or reduced transcription of cellular or reporter genes.

37. The method according to claim 35 or 36, wherein the modified transcription with reporter molecules, preferably the occurrence of certain mRNAs or the EGFP protein, is detected.

38. The method of identifying further proteins which play a role in the development and function of the nervous system and/or are a nuclear pore protein, wherein the method comprises the steps of:
    (a) producing an antibody against a protein according to claim 9,
    (b) contacting a cell extract with the antibody and identifying the antibody/protein complex,

(c) analyzing the complex to identify a protein which has bound to the protein of the complex and is no antibody, and

(d) optionally repeating steps (a) to (c) to identify further proteins of this function.